

190-HOT WORK PROGRAM

190.1 PURPOSE

- A. To assure a safe work environment during welding, cutting and other hot work operations.

190.2 SCOPE

- A. This program is applicable to all Central New Mexico Community College (CNM) employees/students directly involved or assisting in the welding, cutting and other hot work operations.

190.3 DEFINITIONS

- A. *Hot Work*- Any operations that generate flames, spark, heat etc. Examples include, but not limited to welding, cutting, grinding, BBQ.
- B. *Resistance Welding*- a welding technique in which the parts to be joined are held together under pressure and heat is produced by passing a current through the contact resistance formed between the two surfaces.
- C. *Arc Welding*- A technique in which metals are welded using heat generated by an electric arc.
- D. *Oxygen Gas Fueled Welding/Cutting*- A method of welding/cutting in which a combination of gases, usually oxyacetylene, is used to provide a hot flame.
- E. *Hazards* - includes, but not limited to the following; fires and explosions, skin burns, welding "blindness", and respiratory hazards from fumes and smoke.

190.4 RESPONSIBILITIES

- A. Managers/Supervisors/Professors
 - (1) Establish safe areas for welding and cutting operations.
 - (2) Provide training for all affected employees/students whose task includes heat, spark or flame producing operations such as welding, brazing, or grinding.
 - (3) Develop and monitor effective hot work procedures.
 - (4) Ensure employees/students use safe equipment and proper PPE for hot work.
 - (5) Allow only trained and authorized employees to conduct hot work and conduct inspections of the hot work area before operations begin.
- B. Employees
 - (1) Follow all hot work procedures.
 - (2) Properly use appropriate hot work PPE.
 - (3) Inspect all hot work equipment before use.
 - (4) Report any equipment problems or unsafe conditions.
 - (5) Ensure all hot work equipment and PPE are in safe working order.
 - (6) Ensure hot work permits are used for all hot work outside authorized areas.
- C. Safety Director/Designee
 - (1) Develop and maintain the Hot Work program and review it annually.
 - (2) Grant and assist with Hot Work Permit.

190.5 GENERAL PROCEDURE

- A. Where practicable all combustibles shall be relocated at least 35 feet from the hot work that is being performed. Where relocation is impractical, combustibles shall be protected with flameproof covers, shielded with metal, guards, curtains, or wet down the material to help prevent ignition of material.

190-HOT WORK PROGRAM

- B.** Ducts, conveyor systems, and augers that might carry sparks to distant combustibles shall be protected or shut down.
- C.** Where cutting or welding is done near walls, partitions, ceilings, or openings in the floor (grating, manholes, etc.), fire-resistant shields or guards shall be provided to prevent ignition.
- D.** If welding is to be done on a metal wall, partition, ceiling, or solid decking/flooring, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation of heat. Where combustibles cannot be relocated on the opposite side of the work, a fire watch person shall be provided on the opposite side of the work.
- E.** Welding shall not be attempted on a metal partition, wall, and ceiling or decking/flooring constructed of combustible sandwich panels.
- F.** Cutting or welding on pipes or other metal in contact with combustible walls, partitions, floors, ceilings, or roofs shall not be undertaken if the work is close enough to cause ignition by combustion.
- G.** Cutting or welding shall not be permitted in the following situations:
 - (1) In areas not authorized by management.
 - (2) In sprinkled buildings while such protection is impaired unless fire watch procedures are carried on.
 - (3) In the presence of potentially explosive atmospheres.
 - (4) In areas near the storage of exposed, readily ignitable materials.
 - (5) In areas where there is dust accumulation of greater than 1/16 inch within 35 feet radius of the area where welding/hot work will be performed.

190.6 HOT WORK PERMIT

- A.** Any temporary operation involving open flames or producing heat and/or sparks in locations not designated to perform hot work, require a Hot Work Permit. (Welding, grinding, cutting, BBQ, etc.)
- B.** A hot work permit must be filled out each time, at any non-designated area that hot work is performed.
- C.** Hot work Part A must be filled out by safety personnel/designee and signed by the person doing the hot work, safety personnel/designee, and the fire watch. (See example of a hot work permit utilized by CNM on page 8/9)
- D.** Fire Watch
 - (1) All hot work performed that does not have a 35 foot combustible radius clearance must have a person whose sole job is to watch the employee doing hot work and a minimum of 30 minutes after work is complete.
 - (2) All fire watchers must have been trained on proper fire extinguisher use.
 - (3) The fire watcher must fill out the fire watch signoff and final check off on part B of the Hot Work Permit upon completion of work.

190.7 FIRE PREVENTION MEASURES

- A.** A designated welding area shall be established to meet the following requirements:
 - (1) Floors swept and cleaned of combustibles.
 - (2) At least one 10 pound dry chemical fire extinguisher shall be within access of 35 feet of the work area.

190-HOT WORK PROGRAM

(3) Protective dividers such as welding curtains or noncombustible walls will be provided to contain sparks and slag to the combustible free area.

B. Requirements for welding performed outside the designated welding area:

- (1) Portable welding curtains or shields must be used to protect other workers in the welding area.
- (2) A hot-work permit must be completed and complied with prior to initiating welding operations.
- (3) Ensure adequate monitored airflow away from the welder and others.
- (4) Combustible materials must be covered with welding blankets during welding procedures.
- (5) Fire Watch must be provided for all hot-work operations if 35 foot radius clearance from combustibles is not possible.

C. After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers.

190.8 HOT WORK IN CONFINED SPACES

- A.** A space that is large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit (for example, tanks, vessels, coolers, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and is not designed for continuous occupancy.
- B.** Refer to CNM Confined Space Program before commencing any welding, cutting, and/or brazing operations in an area meeting the requirements of a confined space.
- C.** Proper ventilation is required to work in confined spaces.
- D.** When welding or cutting is performed in any confined spaces, the gas cylinders and welding machines shall be left on the outside. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement.
- E.** When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine shall be disconnected from the power source.
- F.** In order to eliminate the possibility of gas escaping through leaks of improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. If practical, the torch and hose shall also be removed from the confined space.
- G.** When welding must be performed in a space entirely screened on all sides, the screens shall be so arranged that no serious restriction of ventilation exists. It is desirable to have the screens so mounted that they are about 2 feet above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding.

190.9 FUMES GASES AND DUST

- A.** Fumes produced by some welding processes can be toxic and may require source extraction. An assessment of the work to be performed must be completed before each job is undertaken. Fumes generally contain particles from the material being welded. Welding fumes from certain metals can have an acute effect on the respiratory system.

190-HOT WORK PROGRAM

- B. Any welding, cutting or burning of lead based metals, zinc, cadmium, mercury, fluorides, beryllium or exotic metals or paints not listed here that could produce hazardous fumes shall have proper ventilation or respiratory protection. This includes inert-gas metal-arc welding or oxygen cutting of stainless steel.
- C. All welding and cutting operations shall be adequately ventilated to prevent the accumulation of toxic materials. This applies not only to the welder, but also to helpers and other personnel in the immediate vicinity.

190.10 PERSONAL PROTECTION

- A. All employees/students are required to wear proper PPE while welding. This includes:
 - (1) Adequate hand protection and clothing must be used to protect the body from welding hazards.
 - (2) Jackets or shoulder covers made of leather or other suitable materials must be worn during overhead welding or cutting operations. Leather skull caps should be worn under helmets to prevent head burns.
 - (3) Sparks may lodge in rolled-up sleeves or pockets of clothing, or cuffs of overalls or trousers. It is therefore recommended that sleeves and collars be kept buttoned and pockets be eliminated from the front of overalls and aprons. Trousers or overalls should not be turned up on the outside. Note: For heavy work, fire-resistant leggings, high boots, or other equivalent clothing should be used.
 - (4) Respiratory protection may need to be utilized in certain situations. Do not wear respirators without a medical evaluation, a fit test, and training on proper use.
 - (5) Helmets and hand shields shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.
 - (6) Helmets shall be provided with filter plates and cover plates designed for easy removal.
 - (7) Helmets and hand shields shall be made of a material, which is an insulator for heat and electricity. Helmets, shields, and goggles shall not be readily flammable and shall be capable of withstanding sterilization.
 - (8) All parts shall be constructed of a material, which will not readily corrode or discolor the skin.
 - (9) All glass for lenses shall be tempered, substantially free from scratches, air bubbles, waves and other flaws. Except when a lens is ground to provide proper optical vision correction, the front and rear surfaces of lenses and windows shall be smooth and parallel.
 - (10) Lenses shall bear some permanent distinctive marking which may readily identify the source and shade.
 - (11) The following is a guide for the selection of the proper shade numbers. These OSHA recommendations may be varied to suit the individual's needs.

Welding Operation	Shade Number	
Shielded metal — arc welding 1/16, 3/32, 1/8-5/32 inch electrodes	10	
Gas-shielded arc welding (nonferrous) 1/16, 3/32, 5/32 inch electrodes	11	
Gas-shielded arc welding (ferrous) 1/16, 3/32, 1/8, 5/32 electrodes	12	
Shielded metal arc welding: 3/16	7/32, 1/4 inch electrodes	12
	5/16, 3/8-inch electrodes	14

190-HOT WORK PROGRAM

Welding Operation	Shade Number
Atomic hydrogen welding	10 – 14
Carbon arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 inch to 6 inches	4 or 5
Heavy cutting, 6 inches or over	5 or 6
Gas welding (light) up to 1/8 inch	4 or 5
Gas welding (medium) 1/8 - 1/2 inch	5 or 6
Gas welding (heavy) 1/2 inch or over	6 or 8

(12) Welders should consider using more advanced auto-darkening helmets with continuously variable controls that adjust the shade from a light state to a dark one and back. These helmets protect from harmful light emissions at all times and darken to almost any pre-selected shade in milliseconds, thanks to quick-changing LCD (Liquid Crystal Display) technology in the auto-darkening cartridges.

190.11 COMPRESSED GAS CYLINDERS

- A. Compressed gas cylinders shall be DOT-approved and legibly marked near the shoulder of the cylinder for the purpose of identifying the gas content with either the chemical or trade name of the gas.
 - (1) All compressed gas cylinder connections must comply with ANSI B57. 1-1965 Standards (See CNM Compressed Gas Cylinder Program).
 - (2) Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.
- B. All cylinders shall be kept away from sources of heat and from radiators and piping systems that may be used for grounding purposes. Cylinders and cylinder valves including couplings and regulators shall be kept free from oily or greasy substances and must not be handled with gloves or rags in the same condition.
- C. Stored oxygen cylinders shall be stored at least 20 feet from the fuel gas cylinders or combustible materials, especially oil or grease, or separated by a non-combustible barrier at least 5 feet high with a fire rating of at least one-half hour. All empty cylinders shall have closed valves. Valve protection caps shall always be in place and hand-tight except when cylinders are in use or connected for use.
- D. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.
- E. All acetylene cylinders shall be stored valve-end up.
- F. Assigned storage spaces shall be stored and secured to ensure cylinders cannot be knocked over or damaged by falling objects or subject to tampering by unauthorized persons.
 - (1) Back flow protection shall be provided by an approved device that will prevent oxygen from flowing into the fuel-gas system or fuel from flowing into the oxygen system.
 - (2) An approved device that will prevent flame from passing into the fuel-gas system shall provide flashback protection.

190-HOT WORK PROGRAM

(3) An approved pressure-relief device set at the appropriate pressure shall provide backpressure protection.

G. Safety devices shall not be tampered with.

190.12 ARC WELDING AND CUTTING

A. All employees/students operating, installing, and maintaining welding equipment shall be qualified or trained to operate and maintain such equipment.

(1) Arc welding equipment must be designed to meet conditions such as exposure to corrosive fumes, excessive humidity, excessive oil vapor, flammable gasses, abnormal vibration or shock, excessive dust and seacoast or shipboard conditions.

(2) It shall be operated at recommended voltage in accordance to the manufacturer recommendations.

(3) Employees/students shall inspect all welding leads before use and report to management/professor if insulation is broken or splices are unprotected.

(4) Welding leads shall not be repaired with electrical tape.

B. A disconnecting switch or controller shall be provided at or near each welding machine along with over current protection.

C. All direct current machines shall be connected with the same polarity and all alternating current machines connected to the same phase of the supply circuit and with the same polarity.

(1) To prevent electrical contact with personnel, all electrode holders shall be placed where they do not make contact with persons, conducting objects or the fuel of compressed gas tanks.

(2) All cables with splices within 10 feet of the holder shall not be used.

D. If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

E. If an object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat sparks and slag and to protect the immovable fire hazards.

190.13 RESISTANCE WELDING

A. All employees/students operating, installing, and maintaining welding equipment shall be qualified or trained to operate and maintain such equipment.

(1) Voltage, interlocks, guarding, grounding and shields shall be in accordance with manufacturer recommendations.

(2) Precautions such as flash guarding, ventilation and shields shall be provided to control flashes, toxic elements and metal fumes.

B. If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

190.14 OXYGEN FUEL GAS WELDING AND CUTTING

A. Only approved apparatuses such as torches, regulators or pressure-reducing valves, setting generators and manifolds shall be used.

(1) Mixtures of fuel gases and air or oxygen may be explosive and must be guarded against.

(2) All hoses and hose connections shall comply with the Compressed Gas Association and Rubber Manufacturers' Associations' applicable standards.

190-HOT WORK PROGRAM

- B.** If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

190-HOT WORK PROGRAM

Hot Work Permit Standard Operating Procedure

1. **PREPARATION: Contact CNM Safety & Environmental Health Department at ext. 43002** if you are planning any work/activity that involves open flame, spark, or heat outside of a designated hot work area.
 - A. Hot work includes welding, blazing, torching, soldering, BBQ, etc.
 - B. If the process also generates smoke, inside the building, contact ITS and follow its protocol in conjunction with following this procedure.
2. **HOT WORK CHECKLIST PART A: Safety Personnel performs or designates a trained personnel to performs the following tasks:**
 - A. Inspect the area in which the hot work activity will take place, using the orange HOT WORK PERMIT form. CHECK ALL ITEMS ON CHECKLIST – USE “N/A” FOR NOT APPLICABLE ITEMS.
 - B. Fill out Part A “INSTRUCTIONS FOR PERMIT AUTHORIZED INDIVIDUAL (PAI)”. Ensure:
 - (1) Time and location are listed.
 - (2) Names and signatures of both individuals performing hot work and fire watching are on the form.
 - (3) Verify that the fire watch knows how to use the fire extinguisher. Test the fire watch on the “PASS” method.
 - (4) Verify that the fire watch knows where the nearest fire alarm pull station is.
 - (5) Emphasize to the fire watch that he/she is not allowed to do any other task except having the fire extinguisher, watch for fire, and put it out and/or pull the fire alarm.
 - C. Verify “HOT WORK CHECK LIST” item and ensure there is at least one fire extinguisher available in the area. If not, contact Safety personnel to obtain one.
 - (1) If the radius distance from the area in which the hot work activity takes place is greater than 35 feet to any combustible materials, no further evaluation is needed for this section of the permit.
 - (2) Put “N/A” on all check boxes of this section and note: “radius of hot work area is greater than 35 feet.”
 - D. Verify “WORK ON WALLS OR CEILINGS”
 - (1) If hot work is performed on walls or ceilings, contact Safety personnel immediately for further instruction. The duration of the fire watch period will be increased up to 3 or 4 hours depending on the situation.
 - E. Verify “WORK IN CONFINED SPACES”
 - (1) If hot work is performed in a confined space, contact Safety personnel immediately for further instruction. The duration of the fire watch time will also be increased.
 - F. Check any applicable boxes in “FIRE WATCH/HOT WORK AREA MONITORING”. If the fire watch time is determined to be more than 30 minutes, note the requirement under “OTHER PRECAUTIONS TAKEN” together with any other additional requirements you think are needed.
 - G. Remind the fire watch of the time required to watch for fire after the hot work is completed.
3. **HOT WORK CHECKLIST PART B: After the fire watch period is completed, the fire watch must:**
 - A. Inspect the area one last time;
 - B. Sign off on part B of the form;
And return the form to the Safety & Environmental Health via CNM mail for documentation

HOT WORK PERMIT

All temporary operations involving open flames or producing heat and/or sparks require a Hot Work Permit. This includes, but is not limited to, brazing, cutting, grinding, soldering, thawing, and welding.

INSTRUCTIONS FOR FIRE SAFETY SUPERVISOR

1. Verify precautions listed at right (or do not proceed with the work).
2. Complete PLY 1 and retain for job files.
3. Post PLY 2 in vicinity of hot work.

DATE _____ JOB NO. _____

LOCATION/BUILDING & FLOOR (Be Specific) _____

DESCRIPTION OF WORK BEING PERFORMED _____

NAME OF PERSON DOING HOT WORK _____

The above location has been examined, the precautions checked on the Hot Work Checklist have been taken to prevent fire, and permission is authorized for this work.

SIGNED: _____
(Fire Safety Supervisor)

SIGNED: _____
(Person doing Hot Work)

SIGNED: _____
(Fire Watch)

TIME STARTED: Date: _____ Time: _____ AM/PM

PERMIT EXPIRES: Date: _____ Time: _____ AM/PM

PART A

HOT WORK CHECKLIST

- Sprinklers and fire hoses streams in service/operable.
- Hot Work equipment in good condition (e.g., power source, welding leads, torches, etc.)
- Multi-purpose fire extinguisher and/or water pump can.

REQUIREMENTS WITHIN 35 FEET OF WORK

- Dust, lint, debris, flammable liquids and oily deposits removed.
- Explosive atmosphere in area eliminated.
- Combustible floors (e.g., wood, tile, carpeting) wet down, covered with damp sand or fire blankets.
- Flammable and combustible material, remove where possible. Otherwise protected with fire blankets, guards, or metal shields.
- All wall and floor openings covered.
- Walkways protected beneath hot work.

WORK ON WALLS OR CEILINGS

- Combustibles moved away from other side of wall.

WORK IN CONFINED SPACES

- Confined space cleaned of all combustibles (example: grease, oil, flammable vapors).
- Containers purged of flammable liquids/vapors.
- Company confined space guidelines followed.

FIRE WATCH/HOT WORK AREA MONITORING

- Fire watch will be provided during and for 30 minutes after work, including any coffee or lunch breaks.
- Fire watch is supplied with an extinguisher, and/or water pump can, also making use of other extinguishers located throughout work area.
- Fire watch is trained in use of this equipment and familiar with location of sounding alarm.
- Fire watch is required for opposite side of walls, above, and below floors and ceilings.

OTHER PRECAUTIONS TAKEN

- _____
- _____

1377998

FILL OUT EMERGENCY INFORMATION ON BACK OF PLY 2.
© Copyright 2008 J. J. KELLER & ASSOCIATES, INC.®, Neenah, WI • USA
(800) 327-6868 • www.jjkeller.com • Printed in the United States

29-TG 982
(Rev. 8/08)

NOTICE DO NOT PRINT/USE THIS COPY AS YOUR OFFICIAL HOT WORK PERMIT

HOT WORK PERMIT

All temporary operations involving open flames or producing heat and/or sparks require a Hot Work Permit. This includes, but is not limited to, brazing, cutting, grinding, soldering, thawing, and welding.

INSTRUCTIONS FOR FIRE SAFETY SUPERVISOR

1. Verify precautions listed at right (or do not proceed with the work).
2. Complete PLY 1 and retain for job files.
3. Post PLY 2 in vicinity of hot work.

DATE _____ JOB NO. _____

LOCATION/BUILDING & FLOOR (Be Specific) _____

DESCRIPTION OF WORK BEING PERFORMED _____

NAME OF PERSON DOING HOT WORK _____

The above location has been examined, the precautions checked on the Hot Work Checklist have been taken to prevent fire, and permission is authorized for this work.

SIGNED: _____
(Fire Safety Supervisor)

SIGNED: _____
(Person doing Hot Work)

SIGNED: _____
(Fire Watch)

TIME STARTED: Date: _____ Time: _____ AM/PM

PERMIT EXPIRES: Date: _____ Time: _____ AM/PM

FIRE WATCH SIGNOFF

Work area and all adjacent areas to which sparks and heat might have spread were inspected during the fire watch period and were found fire safe.

Signed: _____

FINAL CHECKUP (minimum 30 minutes after Hot Work)

Work area was monitored for _____ hour(s) following Hot Work and found fire safe.

Signed: _____

FILL OUT EMERGENCY INFORMATION ON BACK OF PLY 2.

© Copyright 2008 J. J. KELLER & ASSOCIATES, INC.®, Neenah, WI • USA
(800) 327-6868 • www.jjkeller.com • Printed in the United States

PART B

HOT WORK CHECKLIST

- Sprinklers and fire hoses streams in service/operable.
- Hot Work equipment in good condition (e.g., power source, welding leads, torches, etc.)
- Multi-purpose fire extinguisher and/or water pump can.

REQUIREMENTS WITHIN 35 FEET OF WORK

- Dust, lint, debris, flammable liquids and oily deposits removed.
- Explosive atmosphere in area eliminated.
- Combustible floors (e.g., wood, tile, carpeting) wet down, covered with damp sand or fire blankets.
- Flammable and combustible material, remove where possible. Otherwise protected with fire blankets, guards or metal shields.
- All wall and floor openings covered.
- Walkways protected beneath hot work.

WORK ON WALLS OR CEILINGS

- Combustibles moved away from other side of wall.

WORK IN CONFINED SPACES

- Confined space cleaned of all combustibles (example: grease, oil, flammable vapors).
- Containers purged of flammable liquids/vapors.
- Company confined space guidelines followed.

FIRE WATCH/HOT WORK AREA MONITORING

- Fire watch will be provided during and for 30 minutes after work, including any coffee or lunch breaks.
- Fire watch is supplied with an extinguisher, and/or water pump can, also making use of other extinguishers located throughout work area.
- Fire watch is trained in use of this equipment and familiar with location of sounding alarm.
- Fire watch is required for opposite side of walls, above, and below floors and ceilings.

OTHER PRECAUTIONS TAKEN

- _____
- _____

1377998

29-TG 982
(Rev. 8/08)